REMARKS

Claims 24-43 are pending. Independent Claim 24 tracks prior Claim 8 and finds support in original Claim 1, and on page 5, lines 25-*et seq*. and page 8, lines 5-7 of the specification. Claims 25-43 depend from Claim 24 and find support as follows: Claims 25-30 (page 6, lines 13-16), Claims 31-32 (page 6, line 3, page 7, line 3), Claim 33 (page 7, lines 14-15), Claims 34-35 (page 6, line 13, page 17, line 16), Claim 36 (page 14, line 12), Claim 37 (Claim 4), and Claims 37-43 (Fig. 1, page 12, lines 13-17). Accordingly, the Applicants do not believe that any new matter has been added.

Rejection--Obviousness-type Double Patenting

Claims 8-23 were rejected under the judicially-created doctrine of obviousness-type double patenting over claims 1-11 of U.S. Patent No. 6,511,695. This rejection is moot in view of the cancellation of Claims 8-23.

It would not apply to the process of the present claims which require the production of a liquid food product that has not been denatured by the temperature in the system, because the claims of the '695 patent are directed to a method that requires denaturation as well as the production of a denatured gel product. On the other hand, independent Claim 24 requires passage of the liquid food product "through said dynamic high pressure homogenizer at temperature that does not denature said liquid food product" and subsequent recovery of a liquid food product that has not been denatured by heat. Thus, the Applicants respectfully request that this rejection be withdrawn or held in abeyance.

Rejection—35 U.S.C. §112, first paragraph

Claims 14-18 were rejected under 35 U.S.C. 112, first paragraph, as lacking adequate written description. These rejections are moot in view of the cancellation of these claims.

Page 5, lines 31-*et seq.* describe use of a non-denaturing temperature to produce the liquid food product as required by independent Claim 24.

The ranges in Claims 31-32 and 34-35 are explicitly described in the specification on pages 6, 7 and 17. Thus, one with skill in the art would recognize that the Applicants were in possession of the invention as it pertains to values within these ranges. For example, the specification precisely describes the metes and bounds of the processes covered by these claims by disclosing or exemplifying the end points of the ranges 25°C and 60°C (for claim 35) and 100 and 300 mPa (for claim 32). The end points of the claimed ranges in this case are representative of the genus of temperature or pressure conditions described in the claims. Thus, the Applicants have shown or reduced to practice a representative number of species which define the end points of the claimed ranges.

Rejection—35 U.S.C. §112, second paragraph

Claim 17 was rejected under 35 U.S.C. 112, second paragraph, as being indefinite for using the phrase "for a time period in the order of milliseconds". This rejection is now moot.

Rejection—35 U.S.C. §102

Claims 8-10, 12, 13, 16, 19 and 23 were rejected under 35 U.S.C. 102(b) as being anticipated by Klopp et al., DE 3903648A. This rejection is moot in view of the cancellation of these claims. It would not apply to the present claims for the following reasons.

The process of Klopp does not anticipate the invention, because Klopp does not disclose a **dynamic high pressure homogenizer**, such as that exemplified by the Emulsifex-C5 and Emulsifex C160.

The Official Action was concerned that the claims do not describe the structure of a dynamic high pressure homogenizer and that the broadest reasonable interpretation of such a

homogenizer would encompass the prior art devices because they involve dynamic (moving) liquids.

First, the structures of dynamic high pressure homogenizers were well-known in the art as shown by the attached descriptions of the Emulsiflex C5 and C160 homogenizers. These homogenizers are also described at: http:/www.avestin.com/products.html.

Second, independent Claim 24 now requires a homogenizer structured so as to reduce viable microorganisms by increased flow speed and pressure drop which brings about cavitation, shear stresses, turbulence and/or impingement.

Furthermore, Claim 33 now explicitly requires a homogenizer having the structures of the EmulsiFlex C5 or C160 dynamic high pressure homogenizers.

On the other hand, Klopp describes a closed container used as a homogenizer containing a valve which creates cavitations by emitting acoustic radiations into the homogenizer. The liquid is circularly shaken into the homogenizer for a certain period of time, varying between 1-20 minutes, but preferably 5 minutes. Clearly, Klopp describes a compression tube which is designed so that the liquid moves therein circularly with a sonic source located within the compression space. Even though different parts of the Klopp device are called a "homogenizer", the function of those parts is absolutely different. For example, in Klopp the cavitation is created by an oscillator emerged in the liquid or by overflow borders connected in series on the valve. Thus, Klopp does not disclose a continuous pressurizing circulation system which comprises a dynamic high pressure homogenizer that destroys viable microorganisms by increased flow rate and pressure drop leading to cavitation, shear stresses, turbulence and impingement.

Also, the Klopp process does not involve continuously passing a liquid food product through a homogenization valve or disclose other elements of the invention, such as homogenizers having the passage times of the homogenizers used by the present invention.

While the Klopp process may last 1-20 minutes, this differs from the present invention, where the homogenization time is much shorter. For example, the EmulsiFlex dynamic high pressure homogenizers have homogenization times in the order of milliseconds. The EmulsiFlex homogenizers have a passage time of about 20 to 100 milliseconds per ml and 250 milliseconds per ml at flow rates of 1-5 L per hour or at a flow rate of 160 ml/hr. The operating specifications of the EmulsiFlex homogenizers may be found on the web at http:/www.avestin.com/products.html.

Moreover, Klopp does not disclose with sufficient specificity the other aspects of the invention, such as treatment of a liquid food product without denaturation or the other limitations in these claims. The Klopp process is directed to inactivating viruses, such as bacteriophages, in culture supernatants and in products worked up from recombinant microorganisms, such as plasma factor VIII and other blood factors, see page 2, 6th paragraph.

While page 4, line 6, of Klopp does refer to the milk industry, it does not disclose homogenizing a liquid food product such as milk nor does it provide a reasonable expectation of success for destroying particular bacterial contaminants found in milk, such as *Listeria*, *Salmonell*a and *Escherichia* as now required by Claims 38-43. Rather this section of Klopp describes the preparation of solutions freed from viruses, such as starter cultures that may find application in the milk industry.

In view of the differences between the homogenizers used by Klopp, in the homogenization conditions and process steps, and the lack of specificity in describing a method for treating a liquid food product, such as milk, the Applicants respectfully request that this rejection be withdrawn.

Rejection—35 U.S.C. §102

Claims 8, 10, 12, 13, 19, 20 and 23 were rejected under 35 U.S.C. 102(b) as being anticipated by Mun et al., SU 16660218A. This rejection is moot in view of the cancellation of these claims. It would not apply to the present claims for the following reasons.

Mun does not anticipate the present invention, because the prior art process uses a different type of homogenization apparatus. These differences are discussed above. Also, the Mun process does not involve recirculation as required by the present claims. Moreover, Claim 33 now explicitly requires the dynamic high-pressure homogenizer to have the structure exemplified by the C5 or C160 Emulsiflex homogenizers.

Mun uses a pasteurization apparatus in which "dynamic pressure is converted to static pressure. . .creating conditions for rupture of the cell membranes of pathogenic flora" (page 2, lines 22-24). Moreover, the Mun process does not involve recirculation (as does the invention), but repetition of the action which causes the mechanical rupture and pasteurization under static pressure. Since the Mun process is different that that of the present invention because it uses a different type of apparatus and does not involve recirculation, the Applicants request respectfully that this rejection now be withdrawn.

Rejection—35 U.S.C. §103

Claims 21 and 22 were rejected under 35 U.S.C. 103(a) as being unpatentable over Klopp et al., DE 3903648A, in view of Quinet et al., U.S. Patent No. 5,114,733. This rejection is moot in view of the cancellation of Claims 21 and 22. It would not apply to the present claims for the following reasons.

Klopp has been discussed above and does not disclose the homogenization apparatus, conditions and process steps (such as recirculation) of the present invention and does not

disclose with sufficient specificity a method for treating a liquid food product, such as milk, or specifically reducing the titer of pathogens such as *Listeria*, *Salmonella* or *Escherichia*.

Quinet is cited as disclosing a method involving the pasteurization of oils or fats. However, it does not disclose the elements missing from Klopp. Therefore the two references in combination do not disclose all the elements of the invention.

Moreover, there is no suggestion in either document for a process that involves high-pressure dynamic homogenization and recirculation at least three times without denaturation of the liquid food product. Thus, even when reading Quinet and Klopp, someone skilled in the art would not have been motivated to combine these two references to obtain the present invention. Furthermore the cited art does not provide a reasonable expectation of success in obtaining a homogenized liquid food product that is not denatured. For example, Quinet, col. 3, lines 19-27, is unconcerned with whether the food product is denatured, since it refers to pasteurizing the salad mixture within a temperature range of 58°C to 98°C for 10 to 30 mins. On the other hand, the present claims inherently require conditions that do not denature the liquid food product, such as the use of a non-denaturing temperature (specification, page 5, third line from page bottom). Accordingly, these documents, alone or in combination, would not make obvious the repeated passage of liquid containing microorganisms through a continuous pressurizing circulation system comprising a dynamic high pressure homogenizer at a nondenaturing temperature to reduce the presence of viable microorganisms in the liquid food product. Therefore, the Applicants respectfully request that this rejection be withdrawn.

CONCLUSION

In view of the above amendments and remarks, the Applicants respectfully submit that this application is now in condition for allowance. Early notification to that effect is earnestly solicited.

Respectfully submitted,

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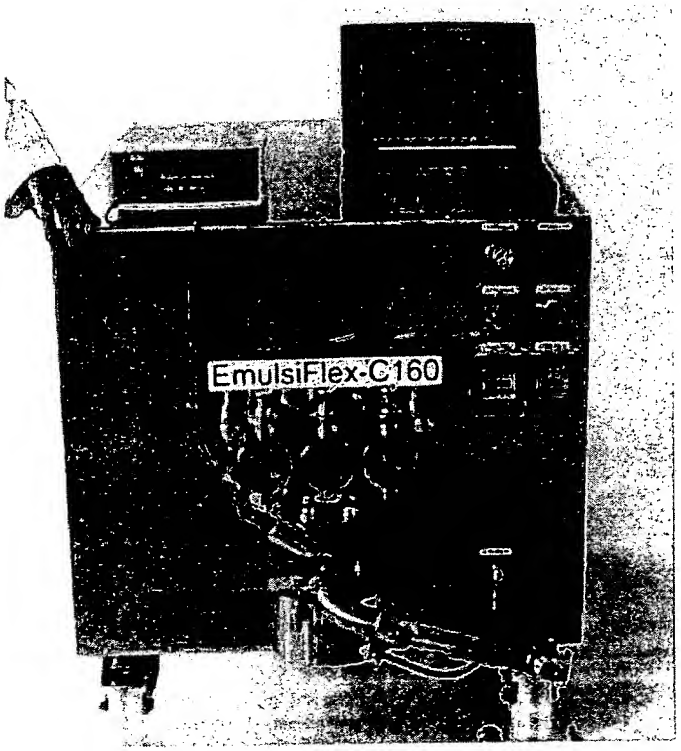
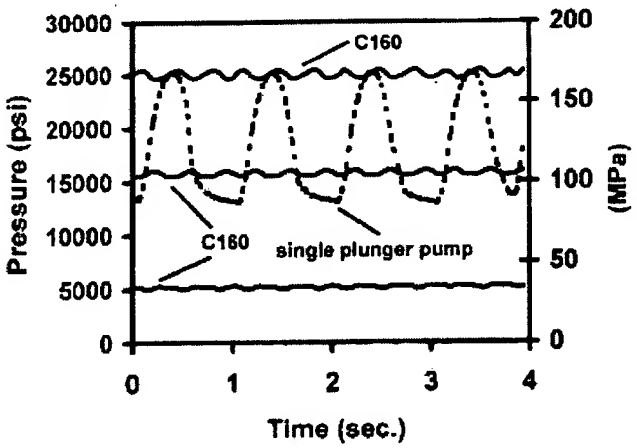
(OSMMN 08/03)



EmulsiFlex-C160 shown with heat exchanger, pressure transducer and digital peak reset meter.



Pressure Pulsation vs. Time. AVESTIN's EmulsiFlex-C160 exhibits virtually no pulsation compared to a single plunger pump. The smooth flow results in a homogeneous product.

EmulsiFlex-C160

Ask for a free CD-ROM, which demonstrates the function of all standard EmulsiFlex equipment. We are ready to test your product. Please contact us.

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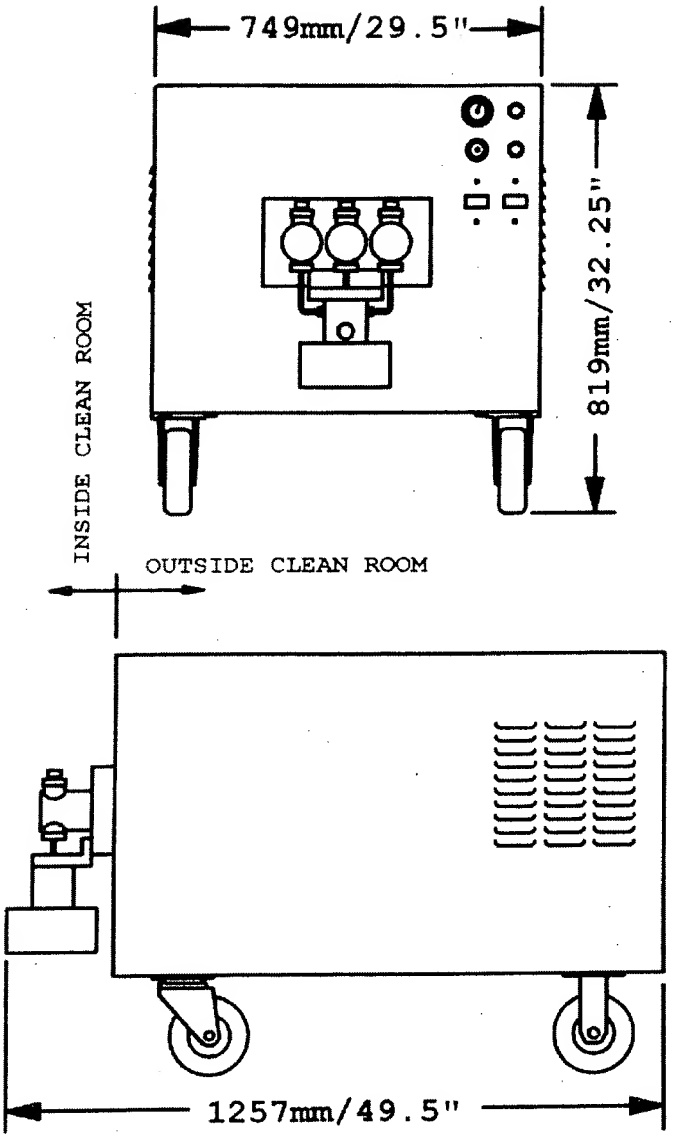
1. Pump

The EmulsiFlex-C160 homogenizer has an electric motor-driven triplex pump developed and manufactured by AVESTIN. Three hardened, stainless steel pump bodies are individually mounted for easy access and maintenance. There are NO "O"-rings or gaskets in the entire pump head. The plunger seal is UHMWPE (Ultra High Molecular Weight Polyethylene); other seal materials are optional. The plunger seal is the only plastic in the pump body. All other seals are precision metal to metal/metal to ceramic face seals without gaskets. The plungers are made of very hard



EmulsiFlex-C160 schematic. The unit weighs approximately 935 lb/420kg unpacked.

ceramic polished to a mirror finish. The entire pump body, including check valves, is easy to disassemble for cleaning and inspection. The drive unit is enclosed in a stainless steel housing for safe, clean and quiet operation. The plunger back flush system is standard.

2. Homogenizing Valve

The standard EmulsiFlex-C160 is delivered with a dynamic homogenizing valve with pneumatic pressure control. The valve's wear parts are manufactured out of hard ceramic as standard. Diamond is also available. AVESTIN's homogenizing valves are designed to be easy to disassemble for cleaning or inspection. NO "O"-rings are present. The only plastic seal is a Teflon ring to seal around the homogenizing valve stem. All other seals are precision metal/ceramic and metal/metal face seals without gaskets.

3. Capacity/Pressure

The standard EmulsiFlex-C160 produces a constant flow rate of 160L/hr/0.7GPM,

independent of the homogenizing pressure. There are two models available: the EmulsiFlex-C160/A is capable of pressures between 500-20000psi/3.5-138MPa whereas the EmulsiFlex-C160/B is capable of pressures between 500-30000psi/3.5-207MPa. The pressure is adjusted using a pneumatic control; once set, the pressure remains steady within a narrow range.

A variable speed version known as the EmulsiFlex-C160/VS is available for those with special requirements. This allows for processing at flow rates between 80L/hr and 160L/hr. The flow rate is infinitely adjustable within this range and easily controlled. The EmulsiFlex-C160/VS will homogenize and meter the product at the same time! Contact us for details.

4. Temperature Control

Products with temperatures up to 70 deg.C can be run. Higher temperature applications require optional equipment. Sanitary heat exchangers

can be sized to cool down or heat up the product correctly.

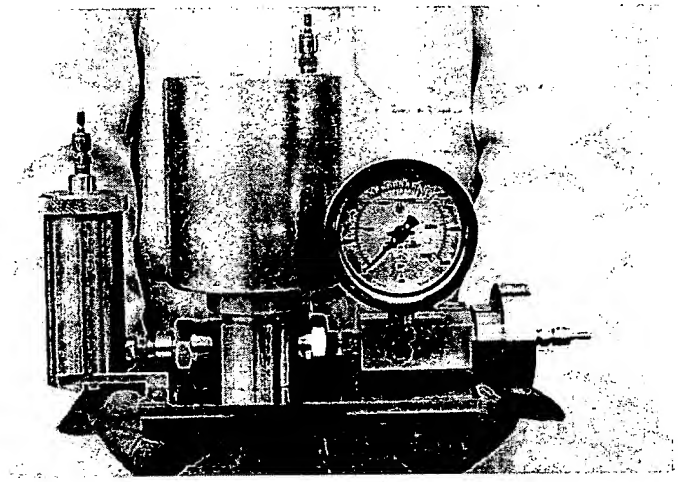
5. Cleaning and Sterilization

All parts, including the check valves, homogenizing valve, pumps and high pressure fittings can be disassembled easily for cleaning and inspection. The entire wetted path, including the pump bodies and the homogenizing valve, can be isolated in a clean room for sterile operation. All of the wetted parts are autoclavable and FDA approvable. The wetted path is SIP (Steam In Place) sterilizable; the pump inlets can easily be connected to steam at 120-130°C. Sodium hydroxide, ethanol, acetone and various other cleaning agents are commonly used for cleaning. The pump inlets can be connected to a compressed air/nitrogen cylinder to flush out the entire product path.

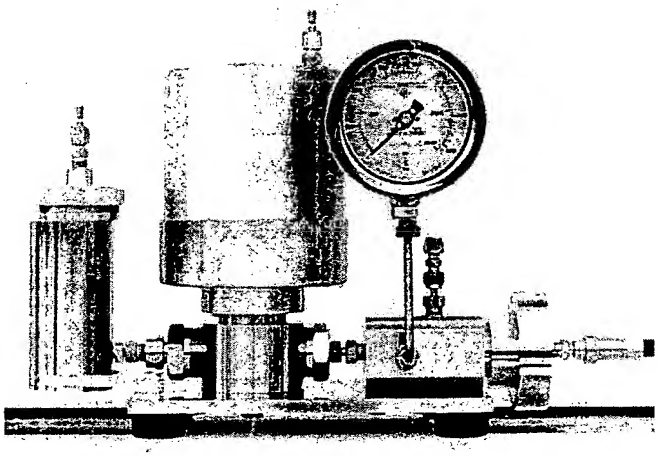
6. Requirements for Operation

The EmulsiFlex-C160 family requires electric power of any common voltage (208V/230V,

380V/400V, 460V, 600V), 3-phase, 50Hz or 60Hz. The pneumatic control of the homogenizing valve uses air/gas with virtually no flow rate and a pressure of approximately 100psi/0.7MPa. The plunger cooling/flush system, used to extend seal life (particularly with abrasive products), will operate on either regular city water or a compatible, low viscosity fluid of your choice. The flow rate required is minimal.



EmulsiFlex-C5 shown with an analogue gauge.



The EmulsiFlex-C5 immersed in a temperature controlled water bath. The entire wetted path is temperature controlled.

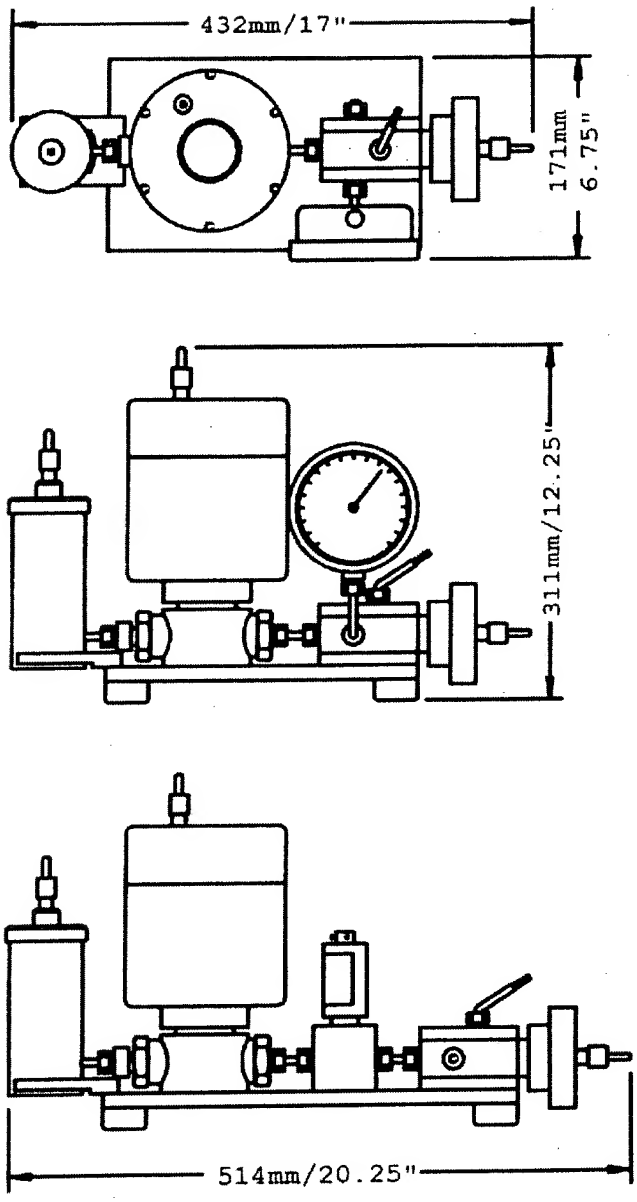
EmulsiFlex-C5

Ask for a free CD-ROM, which demonstrates the function of all standard EmulsiFlex equipment. In most cases we can come to you for a demonstration. Please contact us.

---

1. Pump
The EmulsiFlex-C5 homogenizer has an air/gas driven, high pressure pump developed and manufactured by AVESTIN. There are no "O"-rings or gaskets in the entire path of the product. The only plastic seal is the plunger seal which is UHMWPE (Ultra High Molecular Weight Polyethylene). Quiet operation is due to a specially designed pump motor pilot valve.

2. Homogenizing Valve
The standard EmulsiFlex-C5 is delivered with a pneumatically controlled, dynamic homogenizing valve. No "O"-rings are present. The only plastic seal is a Teflon ring to seal the homogenizing valve stem. All other



The top two (2) drawings are of the standard EF-C5. The bottom drawing shows a pressure transducer in its in-line adapter. Note the bottom option is longer than standard. The EmulsiFlex-C5 weighs approximately 16kg or 35lbs.

seals are precision metal/ceramic and metal/metal face seals without gaskets.

3. Capacity/Pressure
In common with all air driven pumps, the flow rate depends on the homogenizing pressure selected. The EmulsiFlex-C5 has a capacity of 1-5L/hr. A sample as small as 7mL can be processed with a hold back volume of less than 1mL. The homogenizing pressure can be adjusted in the range of 500-30000psi/3.5-207MPa.

4. Temperature Control
Inlet and outlet temperatures can be controlled with installation of an appropriate heat exchanger. The entire instrument can be immersed in a temperature controlled water bath for heating and cooling purposes.

5. Cleaning and Sterilization
Hot water, ethanol, acetone and various other cleaning agents can be flushed through the equipment for quick cleaning. After cleaning, residual fluids may be

removed from the instrument by blowing the system out with compressed air/gas. The unit, including the homogenizing valve, can be fully disassembled for stringent cleaning and inspection if required. All wetted parts are autoclavable and FDA approvable. The inlet of the pump can be connected easily to steam at 120-130°C for steam in place (SIP) sterilization.

6. Requirement for Operation

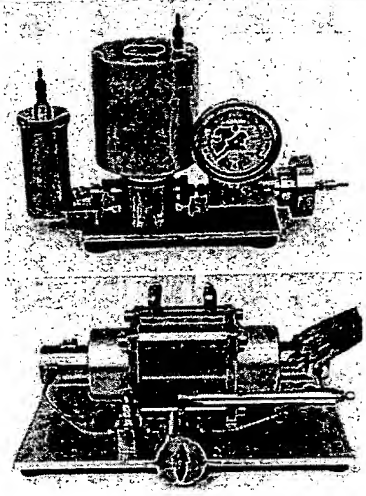
Most laboratories, research facilities and production spaces have sufficient air pressure and flow rate to run the EmulsiFlex-C5. For laboratory use, a nitrogen gas cylinder or small compressor of 3hp/2.2kW is sufficient. The air/gas pressure required depends on the application. For most dispersions, emulsions, liposomes and *E. coli* rupture, an air pressure of 85psi/0.6MPa or more is sufficient.

Cell Rupture Liposomes Emulsions Nanoparticles

High-Pressure Homogenizers for Lab and Production

Model: EmulsiFlex-C3
Capacity: 3L/hr., independent of pressure
Min. sample volume: 10mL

Pressure: up to 30,000psi / 2000bar



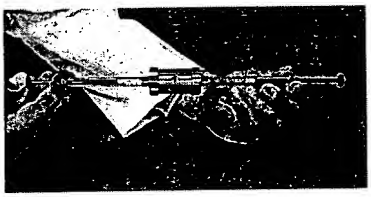
Model: EmulsiFlex-C5
Capacity: 1-5L/hr., depending on pressure
Min. sample volume: 7mL
Pressure: up to 30,000psi / 2000bar

Model: EmulsiFlex-C50
Capacity: 15-50 L/hr, depending on pressure.
Min. sample volume: 25mL

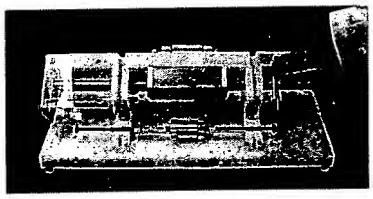
Pressure: up to 30,000psi / 2000bar

Liposomes

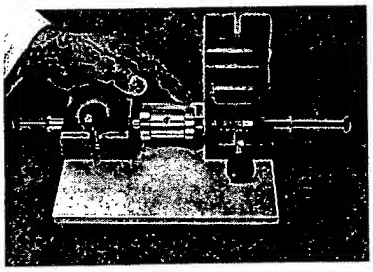
Membrane Extruders for Laboratory



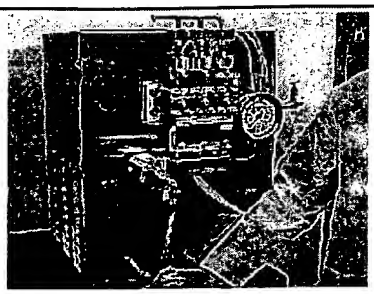
Model: LiposoFast-Basic
Capacity: up to 1.0mL
Min. sample volume: 0.2mL



Model: LiposoFast Pneumatic-Actuator
Pneumatically-assisted extrusion for the LiposoFast-Basic

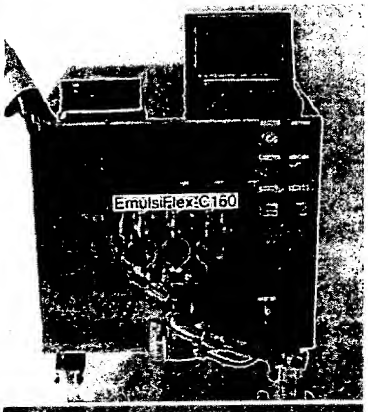


Model: LiposoFast Stabilizer
Simplifies the repetitive use of the LiposoFast-Basic.

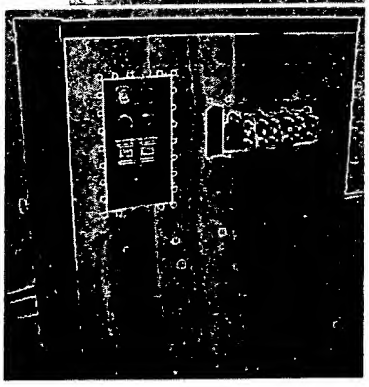


Model: EmulsiFlex-C55
Capacity: 55 L/hr., independent of pressure
Min. sample volume: 30 mL

Pressure: up to 30,000psi / 2000bar



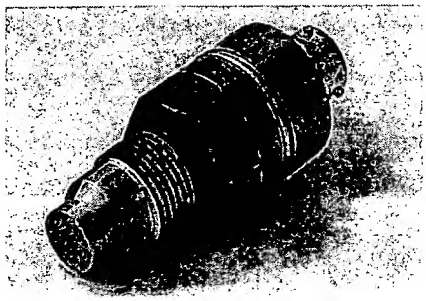
Model: EmulsiFlex-C160
Capacity: 160 L/hr., independent of pressure
Min. sample volume: 40mL
Pressure: up to 30,000psi / 2000bar



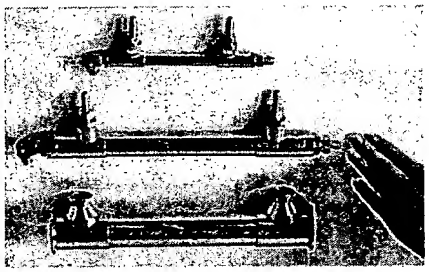
Model: EmulsiFlex-C1000
Capacity: Custom-made to 1000 L/hr.
Min. sample volume: 2L
Pressure: up to 30,000psi / 2000bar

Accessories

for homogenizers



Sanitary Pressure Transducer
Unique sanitary pressure transducer and electronic peak reset meter with digital display. May be integrated into a computer control. Handles pressure up to 30,000 psi / 2000 bar.



Heat Exchangers
Avestin provides a range of heat exchangers which can be used to control product temperature. All heat exchangers are of high quality and are made of stainless steel.

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